

R309-215. Monitoring and Water Quality: Treatment Plant Monitoring Requirements. (September 13, 2005)

Table of Contents

R309-215-1. Purpose.	3
R309-215-2. Authority.	3
R309-215-3. Definitions.	3
R309-215-4. General.	3
R309-215-5. Monitoring Requirements for Groundwater Disinfection.	4
R309-215-6. Monitoring Requirements for Miscellaneous Treatment Plants.	4
R309-215-7. Surface Water Treatment Evaluations.	5
R309-215-8. Surface Water Treatment Plant Monitoring and Reporting.	8
R309-215-9. Turbidity Monitoring and Reporting.	9
R309-215-10. Residual Disinfectant	14
R309-215-12. Monitoring Requirements for Disinfection Byproducts Precursors (DBPP).	15
R309-215-13. Treatment technique for control of disinfection byproduct (DBP) precursors.	16
(1) Applicability	16
(2) Enhanced coagulation and enhanced softening performance requirements	17
(3) Compliance Calculations	20
(4) Treatment Technique Requirements for DBP Precursors	21
R309-215-14. Disinfection Profiling and Benchmarking	21
(1) Determination of systems required to profile	21
(2) Disinfection profiling	24
(3) Disinfection Benchmarking	26

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R309-215. Monitoring and Water Quality: Treatment Plant Monitoring Requirements.

R309-215-1. Purpose.

The purpose of this rule is to outline the monitoring and reporting requirements for public water systems which treat water prior to providing it for human consumption.

R309-215-2. Authority.

This rule is promulgated by the Drinking Water Board as authorized by Title 19, Environmental Quality Code, Chapter 4, Safe Drinking Water Act, Subsection 104 of the Utah Code and in accordance with 63-46a of the same, known as the Administrative Rulemaking Act.

R309-215-3. Definitions.

Definitions for certain terms used in this rule are given in R309-110 but may be further clarified herein.

R309-215-4. General.

- (1) All public water systems are required to monitor their water to determine if they comply with the requirements for water quality stated in R309-200. In exceptional circumstances the Executive Secretary may modify the monitoring requirements given herein as is deemed appropriate.
- (2) The Executive Secretary may determine compliance or initiate compliance actions based upon analytical results and other information compiled by authorized representatives.
- (3) If the water fails to meet minimum standards, then certain public notification procedures shall be carried out, as outlined in R309-220. Water suppliers shall also keep analytical records in their possession, for a required length of time, as outlined in R309-105-17.
- (4) All samples shall be taken at representative sites as specified herein for each contaminant or group of contaminants.

- (5) For the purpose of determining compliance, samples may only be considered if they have been analyzed by the State of Utah primacy laboratory or a laboratory certified by the Utah State Health Laboratory.
- (6) Measurements for pH, temperature, turbidity and disinfectant residual may, under the direction of the direct responsible operator, be performed by any water supplier or their representative.
- (7) All samples shall be marked either: routine, repeat, check or investigative before submission of such samples to a certified laboratory. Routine, repeat, and check samples shall be considered compliance purpose samples.
- (8) All sample results can be sent to the Division of Drinking Water either electronically or in hard copy form.
- (9) Unless otherwise required by the Board, the effective dates on which required monitoring shall be initiated are identical to the dates published in 40 CFR 141 on July 1, 2001 by the Office of the Federal Register
- (10) Exemptions from monitoring requirements shall only be granted in accordance with R309-105-5.

R309-215-5. Monitoring Requirements for Groundwater Disinfection.

- (1) General: Continuous disinfection is recommended for all drinking water sources. Continuous disinfection shall be required of all groundwater sources which do not consistently meet standards of bacteriologic quality. Once required by the Executive Secretary continuous disinfection shall not be interrupted nor terminated unless so authorized, in writing, by the Executive Secretary.
- (2) Disinfection Reporting: For each disinfection treatment facility, plant management shall report information to the Division as specified in R309-105-16(2)(c).
- (3) A water system shall report a malfunction of any facility or equipment such that a detectable residual cannot be maintained throughout the distribution system. The system shall notify the Division as soon as possible, but no later than by the end of the next business day. The system also shall notify the Division by the end of the next business day whether or not the residual was restored to at least 0.2 mg/L within four hours.

R309-215-6. Monitoring Requirements for Miscellaneous Treatment Plants.

(1) Treatment of the drinking water may be required for other than inactivation of microbial contaminants or removal/inactivation of pathogens and viruses. Miscellaneous treatment methods are outlined in R309-535.

(2) The Executive Secretary may require additional monitoring as necessary to evaluate the treatment process and to ensure the quality of the water. The specific analytes, frequency of monitoring, the reporting frequency and the sampling location for which monitoring may be required shall be determined by the following:

(a) the contaminant of concern for which the treatment process has been installed;

(b) the process control samples required to operate treatment process being used; and

(c) alternative surrogate sampling when it is either quicker or less expensive and still provides the necessary information;

(3) For point-of-use or point-of-entry technology the location of sampling may be at each treatment unit spread out over time.

(4) If monitoring is required, the Executive Secretary shall provide the report forms and the water system shall report the data as required by R309-105-16(3). Alternate forms may be used as long as prior approval from the Executive Secretary is obtained.

R309-215-7. Surface Water Treatment Evaluations.

(1) General: Surface water sources or groundwater sources under direct influence of surface water shall be disinfected during the course of required surface water treatment. Disinfection shall not be considered a substitute for inadequate collection facilities. All public water systems which use a treatment technique to treat water obtained in whole or in part from surface water sources or ground water sources under the direct influence of surface water shall monitor the plant's operation and report the results to the Division as indicated in R309-215-7 through R309-215-14. Individual plants will be evaluated in accordance with the criteria outlined in paragraph (2) below. Based on information submitted and/or plant inspections, the plant will receive credit for treatment techniques other than disinfection that remove pathogens, specifically *Giardia lamblia* and viruses. This credit (log removal) will reduce the required disinfectant "CT" value which the plant shall maintain to assure compliance with R309-200-5(7)(a)(i).

(2) Criteria for Individual Treatment Plant Evaluation: New and existing water treatment plants shall meet specified monitoring and performance criteria in order to ensure that filtration and disinfection are satisfactorily practiced. The monitoring requirements and performance criteria for turbidity and disinfection listed above provide the minimum for the Division to evaluate the plant's efficiency in removing and/or inactivating 99.9

percent (3-log) of Giardia lamblia cysts and 99.99 percent (4-log) of viruses as required by R309-505-6(2)(a) and (b).

(3) The Division, upon evaluation of individual raw water sources, surface water or ground water under the direct influence of surface water, may require greater than the 3-log, 4-log removal/inactivation of Giardia and viruses respectfully. If a raw water source exhibits an estimated concentration of 1 to 10 Giardia cysts per 100 liters, 4 and 5-log removal/inactivation may be required. If the raw water exhibits a concentration of 10 to 100 cysts per 100 liters, 5 and 6-log removal/inactivation may be required.

If a plant decides to recycle any spent filter backwash water, thickener supernatant, or liquids from dewatering processes the Division shall be notified in writing by December 8, 2003 or prior to recycling such waters. Such notification shall include, at a minimum:

(a) A plant schematic showing the origin of all flows which are recycled (including, but not limited to, spent filter backwash water, thickener supernatant, and any liquids from dewatering processes), the hydraulic conveyance used to transport them, and the location where they are reintroduced back into the treatment plant.

(b) Typical recycle flow in gallons per minute (gpm), the highest observed plant flow experienced in the previous year (gpm), design flow for the treatment plant (gpm), and Division approved operating capacity for the plant where the Division has made such determinations.

(c) Treatment technique (TT) requirement. Any system that recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes shall return these flows through the processes of a system=s existing conventional or direct filtration system as defined in R309-525 or R309-530 or at an alternate location approved by the Division by or after June 8, 2004. If capital improvements are required to modify the recycle location to meet this requirement, all capital improvements must be completed no later than June 8, 2006.

(4) The Division, upon individual plant evaluation, may assign the treatment techniques (coagulation, flocculation, sedimentation and filtration) credit toward removal of Giardia cysts and viruses. The greater the number of barriers in the treatment process, the greater the reduction of pathogens, therefore lessor credit will be given to processes such as direct filtration which eliminate one or more conventional barriers. Plants may monitor turbidity at multiple points in the treatment process as evidence of the performance of an individual treatment technique.

(5) The nominal credit that will be assigned certain conventional processes are outlined in Table 215-1:

TABLE 215-1 CONVENTIONAL PROCESS CREDIT		
Process	Log Reduction Credit	
	Giardia	Viruses
Conventional Complete Treatment	2.5	2.0
Direct Filtration	2.0	1.0
Slow Sand Filtration	2.0	2.0
Diatomaceous Earth	2.0	1.0

(6) Upon evaluation of information provided by individual plants or obtained during inspections by Division staff, the Division may increase or decrease the nominal credit assigned individual plants based on that evaluation.

(a) Items which would augment the treatment process and thereby warrant increased credit are:

- (i) facilities or means to moderate extreme fluctuations in raw water characteristics;
- (ii) sufficient on-site laboratory facilities regularly used to alert operators to changes in raw water quality;
- (iii) use of pilot stream facilities which duplicate treatment conditions but allow operators to know results of adjustments much sooner than if only monitoring plant effluent;
- (iv) use of additional monitoring methods such as particle size and distribution analysis to achieve greater efficiency in particulate removal;
- (v) regular program for preventive maintenance, records of such, and general good housekeeping; or
- (vi) adequate staff of well trained and certified plant operators.

(b) Items which would be considered a detriment to the treatment process and thereby warrant decreased credit are:

- (i) inadequate staff of trained and certified operators;
- (ii) lack of regular maintenance and poor housekeeping; or
- (iii) insufficient on-site laboratory facilities.

R309-215-8. Surface Water Treatment Plant Monitoring and Reporting.

Treatment plant management shall report the following to the Division within ten days after the end of each month that the system serves water to the public, except as otherwise noted:

- (1) For each day;
 - (a) if the plant treats water from multiple sources, the sources being utilized (including recycled backwash water) and the ratio for each if blending occurs.
 - (b) the total volume of water treated by the plant,
 - (c) the turbidity of the raw water entering the plant,
 - (d) the pH of the effluent water, measured at or near the monitoring point for disinfectant residual,
 - (e) the temperature of the effluent water, measured at or near the monitoring point for disinfectant residual,
 - (f) the type and amount of chemicals used in the treatment process (clearly indicating the weight and active percent of chemical if dry feeders are used, or the percent solution and volume fed if liquid feeders are used),
 - (g) the high and low temperature and weather conditions (local forecast information may be used, but any precipitation in the watershed should be further described as light, moderate, heavy, or extremely heavy), and
 - (h) the results of any "jar tests" conducted that day
- (2) For each filter, each day;
 - (a) the rate of water applied to each (gpm/sq.ft.),
 - (b) the head loss across each (feet of water or psi),
 - (c) length of backwash (if conducted; in minutes), and
 - (d) hours of operation since last backwashed.
- (3) Annually; certify in writing as required by R309-105-14(1) that when a product containing acrylamide and/or epichlorohydrin is used, the combination of the amount of residual monomer in the polymer and the dosage rate does not exceed the levels specified as follows:

- (a) Acrylamide: 0.05%, when dosed at 1 part per million, and
- (b) Epichlorohydrin: 0.01%, when dosed at 20 parts per million.

Certification may rely on manufacturers data.

(4) Additional record-keeping for plants that recycle.

The system must collect and retain on file recycle flow information for review and evaluation by the Division beginning June 8, 2004 or upon approval for recycling. As a minimum the following shall be maintained:

- (a) Copy of the recycle notification and information submitted to the Division under R309-215-7(3).
- (b) List of all recycle flows and the frequency with which they are returned.
- (c) Average and maximum backwash flow rates through the filters and the average and maximum duration of the filter backwash process in minutes.
- (d) Typical filter run length and a written summary of how filter run length is determined.
- (e) The type of treatment provided for the recycle flow.
- (f) Data on the physical dimensions of the equalization and/or treatment units, typical and maximum hydraulic loading rates, type of treatment chemicals used, average dose, frequency of use and frequency at which solids are removed, if applicable.

R309-215-9. Turbidity Monitoring and Reporting.

Public water systems utilizing surface water and surface water under the direct influence of surface water shall monitor for turbidity in accordance with this section. Small surface water systems serving a population less than 10,000 shall monitor in accordance with subsections (1), (2), and (3). Large surface water systems serving 10,000 or more population shall monitor in accordance with subsections (1), (2), (3) and (4).

(1) Routine Monitoring Requirements for Treatment Facilities utilizing surface water sources or ground water sources under the direct influence of surface water.

- (a) All public water systems which use a treatment technique to treat water obtained in whole or in part from surface water sources or ground water sources under the direct influence of surface water shall monitor for turbidity at the treatment plant's clearwell outlet. This monitoring shall be independent of the individual filter monitoring required by R309-525-15(4)(b)(vi) and R309-525-

15(4)(c)(vii). Where the plant facility does not have an internal clearwell, the turbidity shall be monitored at the inlet to a finished water reservoir external to the plant provided such reservoir receives only water from the treatment plant and, furthermore, is located before any point of consumer connection to the water system. If such external reservoir does not exist, turbidity shall then be monitored at a location immediately downstream of the treatment plant filters.

(b) All treatment plants, with the exception of those utilizing slow sand filtration and other conditions indicated in section (c) below, shall be equipped with continuous turbidity monitoring and recording equipment for which the direct responsible charge operator will validate the continuous measurements for accuracy in accordance with paragraph (d) below. These plants shall continuously record the finished water turbidity. If there is a failure in continuous monitoring equipment the system shall conduct grab sampling every 4 hours in lieu of continuous monitoring, but for no more than five working days following the failure of equipment. Large surface water systems serving 10,000 or more population shall monitor the turbidity results of individual filters at a frequency no greater than every 15 minutes.

(c) Turbidity measurements, as outlined below, shall be reported to the Division within ten days after the end of each month that the system serves water to the public. Systems are required to mark and interpret turbidity values from the recorded charts at the end of each four-hour interval of operation (or some shorter regular time interval) to determine compliance with the turbidity performance criterion. For systems using slow sand filtration the Executive Secretary may reduce the sampling frequency to as little as once per day if the Executive Secretary determines that less frequent monitoring is sufficient to indicate effective filtration performance. For systems serving 500 or fewer persons, the Executive Secretary may reduce the turbidity sampling frequency to as little as once per day, regardless of the type of filtration treatment used, if the Executive Secretary determines that less frequent monitoring is sufficient to indicate effective filtration performance.

The following shall be reported and the required percentage achieved for compliance:

- (i) The total number of interpreted filtered water turbidity measurements taken during the month;
- (ii) The number and percentage of interpreted filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in R309-200-5(5)(a)(ii) (or increased limit approved by the Executive Secretary). The percentage of measurements which are less than or equal to the turbidity limit shall be 95 percent or greater for compliance; and

(iii) The date and value of any turbidity measurements taken during the month which exceed 5 NTU. The system shall inform the Division as soon as practical, but no later than 24 hours after the exceedance is known, in accordance with R309-220-6(2)(c) if any turbidity measurements exceed 5 NTU.

(d) The analytical method which shall be followed in making the required determinations shall be Nephelometric Method - Nephelometric Turbidity Unit as set forth in the latest edition of Standard Methods for Examination of Water and Wastewater, 1985, American Public Health Association et al., (Method 214A, pp. 134-136 in the 16th edition). Continuous turbidity monitoring equipment shall be checked for accuracy and recalibrated using methods outlined in the above standard at a minimum frequency of monthly. The direct responsible charge operator will note on the turbidity report form when these recalibrations are conducted.

(2) Procedures if a Filtered Water Turbidity Limit is Exceeded

(a) Resampling -

If an analysis indicates that the turbidity limit has been exceeded, the sampling and measurement shall be confirmed by resampling as soon as practicable and preferably within one hour.

(b) If the result of resampling confirms that the turbidity limit has been exceeded, the system shall collect and have analyzed at least one bacteriologic sample near the first service connection from the source as specified in R309-210-5(1)(f). The system shall collect this bacteriologic sample within 24 hours of the turbidity exceedance. Sample results from this monitoring shall be included in determining bacteriologic compliance for that month.

(c) Initial Notification of the Executive Secretary -

If the repeat sample confirms that the turbidity limit has been exceeded, the supplier shall report this fact to the Executive Secretary as soon as practical, but no later than 24 hours after the exceedance is known in accordance with the public notification requirements under R309-220-6(2)(c). This reporting is in addition to reporting the incident on any monthly reports.

(3) For the purpose of individual plant evaluation and establishment of pathogen removal credit for the purpose of lowering the required "CT" value assigned a plant, plant management may do additional turbidity monitoring at other points to satisfy criteria in R309-215-7(2).

(4) Additional Large surface water systems (serving greater than 10,000 population) reporting and recordkeeping requirements.

In addition to the reporting and recordkeeping requirements above, a large surface water system that provides conventional filtration treatment or direct filtration shall report monthly to the Division the information specified in paragraphs (a) and (b) of this section beginning January 1, 2002. In addition to the reporting and recordkeeping requirements above, a public water system subject to the requirements of this subpart that provides filtration approved under R309-530-8 or R309-530-9 shall report monthly to the Division the information specified in paragraphs (a) of this section beginning January 1, 2002. The reporting in paragraph (a) of this section is in lieu of the reporting specified above.

(a) Turbidity measurements, as required om R309-200-5(5)(a), shall be reported within 10 days after the end of each month the system serves water to the public. Information that shall be reported includes:

- (i) The total number of filtered water turbidity measurements taken during the month.
- (ii) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to 0.3 NTU or those levels established under R309-200-5(5)(a)(ii).
- (iii) The date and value of any turbidity measurements taken during the month which exceed 1 NTU for systems using conventional filtration treatment or direct filtration, or which exceed the maximum level set by the Executive Secretary under R309-530-8 or R309-530-9.

(b) Systems shall maintain the results of individual filter monitoring taken under R309-215-9(1)(b) for at least three years. Systems shall record the results of individual filter monitoring every 15 minutes. Systems shall report that they have conducted individual filter turbidity monitoring within 10 days after the end of each month the system serves water to the public. Systems shall report individual filter turbidity measurement results within 10 days after the end of each month the system serves water to the public only if measurements demonstrate one or more of the conditions in paragraphs (b)(i) through (iv) of this section. Systems that use lime softening may apply to the Executive Secretary for alternative exceedance levels for the levels specified in paragraphs (b)(i) through (iv) of this section if they can demonstrate that higher turbidity levels in individual filters are due to lime carryover only and not due to degraded filter performance.

- (i) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart, the system shall report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system shall either produce a filter profile for the filter within 7 days of the exceedance (if the system is not able to identify an obvious reason for the

abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.

(ii) For any individual filter that has a measured turbidity level of greater than 0.5 NTU in two consecutive measurements taken 15 minutes apart at the end of the first four hours of continuous filter operation after the filter has been backwashed or otherwise taken offline, the system shall report the filter number, the turbidity, and the date(s) on which the exceedance occurred. In addition, the system shall either produce a filter profile for the filter within 7 days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.

(iii) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each of three consecutive months, the system shall report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system shall conduct a self-assessment of the filter within 14 days of the exceedance and report that the self-assessment was conducted. The self assessment shall consist of at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.

(iv) For any individual filter that has a measured turbidity level of greater than 2.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each of two consecutive months, the system shall report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system shall arrange for and conduct a comprehensive performance evaluation by the Division or a third party approved by the Executive Secretary no later than 30 days following the exceedance and have the evaluation completed and submitted to the Division no later than 90 days following the exceedance.

(c) Additional reporting requirements.

(i) If at any time the turbidity exceeds 1 NTU in representative samples of filtered water in a system using conventional filtration treatment or direct filtration, the system shall inform the Division as soon as possible, but no later than the end of the next business day.

(ii) If at any time the turbidity in representative samples of filtered water exceeds the maximum level set by the Executive Secretary under R309-530-8 or R309-530-9 for filtration technologies other than conventional

filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration, the system shall inform the Division as soon as possible, but no later than the end of the next business day.

R309-215-10. Residual Disinfectant.

Treatment plant management shall continuously monitor disinfectant residuals and report the following to the Division within ten days after the end of each month that the system serves water to the public, except as otherwise noted:

(1) For each day, the lowest measurement of residual disinfectant concentration in mg/L in water entering the distribution system, except that if there is a failure in the continuous monitoring equipment, grab sampling every 4 hours may be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment. Systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies listed in Table 215.2 below:

TABLE 215-2 RESIDUAL GRAB SAMPLE FREQUENCY	
System size by population	Samples/day
Less than 500	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4
Note: The day's samples cannot be taken at the same time. The sampling intervals are subject to Executive Secretary's review and approval.	

(2) The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 mg/L and when the Division was notified of the occurrence. The system shall notify the Division as soon as possible, but no later than by the end of the next business day. The system also shall notify the Division by the end of the next business day whether or not the residual was restored to at least 0.2 mg/L within four hours.

(3) The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to R309-210-5:

- (a) number of instances where the residual disinfectant concentration is measured;
- (b) number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

(c) number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

(d) number of instances where no residual disinfectant concentration is detected and where HPC is greater than 500/ml;

(e) number of instances where the residual disinfectant concentration is not measured and HPC is greater than 500/ml;

(f) for the current and previous month the system serves water to the public, the value of "V" in the formula, $V = ((c+d+e)/(a+b)) \times 100$, where a = the value in sub-section (a) above, b = the value in sub-section (b) above, c = the value in sub-section (c) above, d = the value in sub-section (d) above, and e = the value in sub-section (e) above.

R309-215-11. Waterborne Disease Outbreak.

Each public water system, upon discovering that a waterborne disease outbreak as defined in R309-110 potentially attributable to their water system has occurred, shall report that occurrence to the Division as soon as possible, but no later than by the end of the next business day.

R309-215-12. Monitoring Requirements for Disinfection Byproducts Precursors (DBPP).

(1) Routine monitoring. Surface water systems which use conventional filtration treatment (as defined in R309-110) shall monitor each treatment plant for TOC no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All systems required to monitor under this paragraph (1) shall also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all systems shall monitor for alkalinity in the source water prior to any treatment. Systems shall take one paired sample and one source water alkalinity sample per month per plant at a time representative of normal operating conditions and influent water quality.

(2) Reduced monitoring. Surface water systems with an average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, may reduce monitoring for both TOC and alkalinity to one paired sample and one source water alkalinity sample per plant per quarter. The system shall revert to routine monitoring in the month following the quarter when the annual average treated water TOC is greater than or equal to 2.0 mg/L.

(3) Compliance shall be determined as specified by R309-215-13(3). Systems may begin monitoring to determine whether Step 1 TOC removals can be met 12 months prior to the compliance date for the system. This monitoring is not required and failure to

monitor during this period is not a violation. However, any system that does not monitor during this period, and then determines in the first 12 months after the compliance date that it is not able to meet the Step 1 requirements in R309-215-13(2)(b) and shall therefore apply for alternate minimum TOC removal (Step 2) requirements, is not eligible for retroactive approval of alternate minimum TOC removal (Step 2) requirements as allowed pursuant to R309-215-13(2)(c) and is in violation. Systems may apply for alternate minimum TOC removal (Step 2) requirements any time after the compliance date. For systems required to meet Step 1 TOC removals, if the value calculated under R309-215-13(3)(a)(iv) is less than 1.00, the system is in violation of the treatment technique requirements and shall notify the public pursuant to R309-220, in addition to reporting to the Executive Secretary pursuant to R309-105-16.

R309-215-13. Treatment technique for control of disinfection byproduct (DBP) precursors.

(1) Applicability.

(a) Surface water systems using conventional filtration treatment (as defined in R309-110) shall operate with enhanced coagulation or enhanced softening to achieve the TOC percent removal levels specified in paragraph (2) of this section unless the system meets at least one of the alternative compliance criteria listed in paragraph (1)(b) or (1)(c) of this section.

(b) Alternative compliance criteria for enhanced coagulation and enhanced softening systems. Surface Water Systems using conventional filtration treatment may use the alternative compliance criteria in paragraphs (1)(b)(i) through (vi) of this section to comply with this section in lieu of complying with paragraph (2) of this section. Systems shall still comply with monitoring requirements in R309-215-12.

(i) The system's source water TOC level, measured according to R309-200-4(3), is less than 2.0 mg/L, calculated quarterly as a running annual average.

(ii) The system's treated water TOC level, measured according to R309-200-4(3), is less than 2.0 mg/L, calculated quarterly as a running annual average

(iii) The system's source water TOC level, measured according to R309-200-4(3), is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity, measured according to R309-200-4(3), is greater than 60 mg/L (as CaCO₃), calculated quarterly as a running annual average; and either the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively; or

prior to the effective date for compliance in R309-210-8(1)(a), the system has made a clear and irrevocable financial commitment not later than the effective date for compliance in R309-210-8(1)(a) to use of technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Systems shall submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the Executive Secretary for approval not later than the effective date for compliance in R309-210-8(1)(a). These technologies shall be installed and operating not later than June 30, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of National Primary Drinking Water Regulations.

(iv) The TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively, and the system uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.

(v) The system's source water SUVA, prior to any treatment and measured monthly according to R309-200-4(3), is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(vi) The system's finished water SUVA, measured monthly according to R309-200-4(3), is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(c) Additional alternative compliance criteria for softening systems. Systems practicing enhanced softening that cannot achieve the TOC removals required by paragraph (2)(b) of this section may use the alternative compliance criteria in paragraphs (1)(c)(i) and (ii) of this section in lieu of complying with paragraph (2) of this section. Systems shall still comply with monitoring requirements in R309-210-8(4).

(i) Softening that results in lowering the treated water alkalinity to less than 60 mg/L (as CaCO₃), measured monthly according to R309-200-4(3) and calculated quarterly as a running annual average.

(ii) Softening that results in removing at least 10 mg/L of magnesium hardness (as CaCO₃), measured monthly and calculated quarterly as an annual running average.

(2) Enhanced coagulation and enhanced softening performance requirements.

(a) Systems shall achieve the percent reduction of TOC specified in paragraph (2)(b) of this section between the source water and the combined filter effluent, unless the Executive Secretary approves a system's request for alternate minimum TOC removal (Step 2) requirements under paragraph (2)(c) of this section.

(b) Required Step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured in accordance with R309-200-4(3). Systems practicing softening are required to meet the Step 1 TOC reductions in the far-right column (Source water alkalinity >120 mg/L) for the specified source water TOC:

<p>TABLE 215-3</p> <p>Step 1 Required Removal of TOC by Enhanced Coagulation and Enhanced Softening for Surface Water Systems Using Conventional Treatment</p> <p>(See Notes 1,2)</p>			
Source-Water TOC, mg/l	Source-Water Alkalinity, mg/L as CaCO ₃		
	0 – 60	>60 – 120	>120 (Note 3)
>2.0-4.0	35.0%	25.0%	15.0%
>4.0-8.0	45.0%	35.0%	25.0%
>8.0	50.0%	40.0%	30.0%
<p>Note 1: Systems meeting at least one of the conditions in paragraph (1)(b)(i)-(vi) of this section are not required to operate with enhanced coagulation.</p>			
<p>Note 2: Softening systems meeting one of the alternative compliance criteria in paragraph (1)(c) of this section are not required to operate with enhanced softening.</p>			
<p>Note 3: Systems practicing softening shall meet the TOC removal requirements in this column.</p>			

(c) Surface water systems using conventional treatment systems that cannot achieve the Step 1 TOC removals required by paragraph (2)(b) of this section due to water quality parameters or operational constraints shall apply to the Executive Secretary, within three months of failure to achieve the TOC removals required by paragraph (2)(b) of this section, for approval of alternative minimum TOC removal (Step 2) requirements submitted by the system. If the Executive Secretary approves the alternative minimum TOC removal (Step 2) requirements, the Executive Secretary may make those requirements retroactive for the purposes of determining compliance. Until the Executive Secretary approves the alternate minimum TOC removal (Step 2) requirements, the system shall meet the Step 1 TOC removals contained in paragraph (2)(b) of this section.

(d) Alternate minimum TOC removal (Step 2) requirements. Applications made to the Executive Secretary by enhanced coagulation systems for approval of alternate minimum TOC removal (Step 2) requirements under paragraph (2)(c) of

this section shall include, at a minimum, results of bench- or pilot-scale testing conducted under paragraph (2)(d)(i) of this section. The submitted bench- or pilot- scale testing shall be used to determine the alternate enhanced coagulation level.

(i) Alternate enhanced coagulation level is defined as: Coagulation at a coagulant dose and pH as determined by the method described in paragraphs (2)(d)(i) through (v) of this section such that an incremental addition of 10 mg/L of alum (or equivalent amount of ferric salt) results in a TOC removal of less than or equal to 0.3 mg/L. The percent removal of TOC at this point on the "TOC removal versus coagulant dose" curve is then defined as the minimum TOC removal required for the system. Once approved by the Executive Secretary, this minimum requirement supersedes the minimum TOC removal required by the table in paragraph (2)(b) of this section. This requirement will be effective until such time as the Executive Secretary approves a new value based on the results of a new bench- and pilot-scale test. Failure to achieve Executive Secretary set alternative minimum TOC removal levels is a violation of R309-215-13.

(ii) Bench- or pilot-scale testing of enhanced coagulation shall be conducted by using representative water samples and adding 10 mg/L increments of alum (or equivalent amounts of ferric salt) until the pH is reduced to a level less than or equal to the enhanced coagulation Step 2 target pH shown in the following table 215-4:

TABLE 215-4 ENHANCED COAGULATION STEP 2 TARGET pH	
ALKALINITY (mg/L as CaCO ₃)	TARGET pH
0-60	5.5
>60-120	6.3
>120-240	7.0
>240	7.5

(iii) For waters with alkalinities of less than 60 mg/L for which addition of small amounts of alum or equivalent addition of iron coagulant drives the pH below 5.5 before significant TOC removal occurs, the system shall add necessary chemicals to maintain the pH between 5.3 and 5.7 in samples until the TOC removal of 0.3 mg/L per 10 mg/L alum added (or equivalent addition of iron coagulant) is reached.

(iv) The system may operate at any coagulant dose or pH necessary (consistent with other NPDWRs) to achieve the minimum TOC percent removal approved under paragraph (2)(c) of this section.

(v) If the TOC removal is consistently less than 0.3 mg/L of TOC per 10 mg/L of incremental alum dose at all dosages of alum (or equivalent

addition of iron coagulant), the water is deemed to contain TOC not amenable to enhanced coagulation. The system may then apply to the Executive Secretary for a waiver of enhanced coagulation requirements.

(3) Compliance Calculations.

(a) Surface Water Systems other than those identified in paragraphs (1)(b) or (1)(c) of this section shall comply with requirements contained in paragraphs (2)(b) or (2)(c) of this section. Systems shall calculate compliance quarterly, beginning after the system has collected 12 months of data, by determining an annual average using the following method:

(i) Determine actual monthly TOC percent removal, equal to: $(1 - (\text{treated water TOC} / \text{source water TOC})) \times 100$.

(ii) Determine the required monthly TOC percent removal (from either the table in paragraph (2)(b) of this section or from paragraph (2)(c) of this section).

(iii) Divide the value in paragraph (3)(a)(i) of this section by the value in paragraph (3)(a)(ii) of this section.

(iv) Add together the results of paragraph (3)(a)(iii) of this section for the last 12 months and divide by 12.

(v) If the value calculated in paragraph (3)(a)(iv) of this section is less than 1.00, the system is not in compliance with the TOC percent removal requirements.

(b) Systems may use the provisions in paragraphs (3)(b)(i) through (v) of this section in lieu of the calculations in paragraph (3)(a)(i) through (v) of this section to determine compliance with TOC percent removal requirements.

(i) In any month that the system's treated or source water TOC level, measured according to R309-200-4(3), is less than 2.0 mg/L, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(ii) In any month that a system practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO₃), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(iii) In any month that the system's source water SUVA, prior to any treatment and measured according to R309-200-4(3), is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(iv) In any month that the system's finished water SUVA, measured according to R309-200-4(3), is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(v) In any month that a system practicing enhanced softening lowers alkalinity below 60 mg/L (as CaCO₃), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(c) Surface Water Systems using conventional treatment may also comply with the requirements of this section by meeting the criteria in paragraph (1)(b) or (c) of this section.

(4) Treatment Technique Requirements for DBP Precursors.

The Executive Secretary identifies the following as treatment techniques to control the level of disinfection byproduct precursors in drinking water treatment and distribution systems: For Surface Water Systems using conventional treatment, enhanced coagulation or enhanced softening.

R309-215-14. Disinfection Profiling and Benchmarking.

(1) Determination of systems required to profile.

A public water system subject to the requirements of this subpart shall determine its TTHM annual average using the procedure in paragraph (1)(a) of this section and its HAA5 annual average using the procedure in paragraph (1)(b) of this section. The annual average is the arithmetic average of the quarterly averages of four consecutive quarters of monitoring.

(a) The TTHM annual average shall be the annual average during the same period as is used for the HAA5 annual average.

(i) Those systems that collected data under the provisions of 40 CFR 141.142 subpart M (Information Collection Rule) shall use the results of the samples collected during the last four quarters of required monitoring.

(ii) Those systems that use grandfathered HAA5 occurrence data that meet the provisions of paragraph (1)(b)(ii) of this section shall use TTHM data collected at the same time under the provisions of R309-200-5(3)(c)(vii) and R309-210-9.

(iii) Those systems that use HAA5 occurrence data that meet the provisions of paragraph (1)(b)(iii)(A) of this section shall use TTHM data collected at the same time under the provisions of R309-200-5(3)(c)(vii) and R309-210-9.

(b) The HAA5 annual average shall be the annual average during the same period as is used for the TTHM annual average.

(i) Those systems that collected data under the provisions of 40 CFR 141.142 subpart M (Information Collection Rule) shall use the results of the samples collected during the last four quarters of required monitoring.

(ii) Those systems that have collected four quarters of HAA5 occurrence data that meets the routine monitoring sample number and location requirements for TTHM in R309-200-5(3)(c)(vii) and R309-210-9 and handling and analytical method requirements of R309-200-4(3) may use those data to determine whether the requirements of this section apply.

(iii) Those systems that have not collected four quarters of HAA5 occurrence data that meets the provisions of either paragraph (1)(b)(i) or (ii) of this section by March 16, 1999 shall either:

(A) Conduct monitoring for HAA5 that meets the routine monitoring sample number and location requirements for TTHM in R309-200-5(3)(c)(vii) and R309-210-9 and handling and analytical method requirements of R309-200-4(3) to determine the HAA5 annual average and whether the requirements of paragraph (2) of this section apply. This monitoring shall be completed so that the applicability determination can be made no later than March 31, 2000, or

(B) Comply with all other provisions of this section as if the HAA5 monitoring had been conducted and the results required compliance with paragraph (2) of this section.

(c) The system may request that the Executive Secretary approve a more representative annual data set than the data set determined under paragraph (1)(a)

or (b) of this section for the purpose of determining applicability of the requirements of this section.

(d) The Executive Secretary may require that a system use a more representative annual data set than the data set determined under paragraph (1)(a) or (b) of this section for the purpose of determining applicability of the requirements of this section.

(e) The system shall submit data to the Executive Secretary on the schedule in paragraphs (1)(e)(i) through (v) of this section.

(i) Those systems that collected TTHM and HAA5 data under the provisions of subpart M (Information Collection Rule), as required by paragraphs (1)(a)(i) and (1)(b)(i) of this section, shall submit the results of the samples collected during the last 12 months of required monitoring under 40 CFR section 141.142 (Information Collection Rule) not later than December 31, 1999.

(ii) Those systems that have collected four consecutive quarters of HAA5 occurrence data that meets the routine monitoring sample number and location for TTHM in R309-200-5(3)(c)(vii) and R309-210-9 and handling and analytical method requirements of R309-200-4(3), as allowed by paragraphs (1)(a)(ii) and (1)(b)(ii) of this section, shall submit those data to the Executive Secretary not later April 16, 1999. Until the Executive Secretary has approved the data, the system shall conduct monitoring for HAA5 using the monitoring requirements specified under paragraph (1)(b)(iii) of this section.

(iii) Those systems that conduct monitoring for HAA5 using the monitoring requirements specified by paragraphs (1)(a)(iii) and (1)(b)(iii)(A) of this section, shall submit TTHM and HAA5 data not later than April 1, 2000.

(iv) Those systems that elect to comply with all other provisions of this section as if the HAA5 monitoring had been conducted and the results required compliance with this section, as allowed under paragraphs (1)(b)(iii)(B) of this section, shall notify the Executive Secretary in writing of their election not later than December 31, 1999.

(v) If the system elects to request that the Executive Secretary approve a more representative annual data set than the data set determined under paragraph (1)(b)(i) of this section, the system shall submit this request in writing not later than December 31, 1999.

(f) Any system having either a TTHM annual average greater than or equal to 0.064 mg/L or an HAA5 annual average greater than or equal to 0.048 mg/L

during the period identified in paragraphs (1)(a) and (b) of this section shall comply with paragraph (2) of this section.

(2) Disinfection profiling.

(a) Any system that meets the criteria in paragraph (1)(f) of this section shall develop a disinfection profile of its disinfection practice for a period of up to three years.

(b) The system shall monitor daily for a period of 12 consecutive calendar months to determine the total logs of inactivation for each day of operation, based on the CT_{99.9} values in Tables 1.1-1.6, 2.1, and 3.1 of Section 141.74(b)(3) in the code of Federal Regulations (also available from the Division), as appropriate, through the entire treatment plant. This system shall begin this monitoring not later than April 1, 2000. As a minimum, the system with a single point of disinfectant application prior to entrance to the distribution system shall conduct the monitoring in paragraphs (2)(b)(i) through (iv) of this section. A system with more than one point of disinfectant application shall conduct the monitoring in paragraphs (2)(b)(i) through (iv) of this section for each disinfection segment. The system shall monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in R309-200-4(3), as follows:

(i) The temperature of the disinfected water shall be measured once per day at each residual disinfectant concentration sampling point during peak hourly flow.

(ii) If the system uses chlorine, the pH of the disinfected water shall be measured once per day at each chlorine residual disinfectant concentration sampling point during peak hourly flow.

(iii) The disinfectant contact time(s) ("T") shall be determined for each day during peak hourly flow.

(iv) The residual disinfectant concentration(s) ("C") of the water before or at the first customer and prior to each additional point of disinfection shall be measured each day during peak hourly flow.

(c) In lieu of the monitoring conducted under the provisions of paragraph (2)(b) of this section to develop the disinfection profile, the system may elect to meet the requirements of paragraph (2)(c)(i) of this section. In addition to the monitoring conducted under the provisions of paragraph (2)(b) of this section to develop the disinfection profile, the system may elect to meet the requirements of paragraph (2)(c)(ii) of this section.

(i) A PWS that has three years of existing operational data may submit those data, a profile generated using those data, and a request that the Executive Secretary approve use of those data in lieu of monitoring under the provisions of paragraph (2)(b) of this section not later than March 31, 2000. The Executive Secretary shall determine whether these operational data are substantially equivalent to data collected under the provisions of paragraph (2)(b) of this section. These data shall also be representative of *Giardia lamblia* inactivation through the entire treatment plant and not just of certain treatment segments. Until the Executive Secretary approves this request, the system is required to conduct monitoring under the provisions of paragraph (2)(b) of this section.

(ii) In addition to the disinfection profile generated under paragraph (2)(b) of this section, a PWS that has existing operational data may use those data to develop a disinfection profile for additional years. Such systems may use these additional yearly disinfection profiles to develop a benchmark under the provisions of paragraph (3) of this section. The Executive Secretary shall determine whether these operational data are substantially equivalent to data collected under the provisions of paragraph (2)(b) of this section. These data shall also be representative of inactivation through the entire treatment plant and not just of certain treatment segments.

(d) The system shall calculate the total inactivation ratio as follows:

(i) If the system uses only one point of disinfectant application, the system may determine the total inactivation ratio for the disinfection segment based on either of the methods in paragraph (2)(d)(i)(A) or (2)(d)(i)(B) of this section.

(A) Determine one inactivation ratio ($CT_{calc}/CT_{99.9}$) before or at the first customer during peak hourly flow.

(B) Determine successive $CT_{calc}/CT_{99.9}$ values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Under this alternative, the system shall calculate the total inactivation ratio by determining ($CT_{calc}/CT_{99.9}$) for each sequence and then adding the ($CT_{calc}/CT_{99.9}$) values together to determine sum of ($CT_{calc}/CT_{99.9}$).

(ii) If the system uses more than one point of disinfectant application before the first customer, the system shall determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The ($CT_{calc}/CT_{99.9}$) value of each segment and sum of

(CTcalc/CT99.9) shall be calculated using the method in paragraph (b)(4)(i) of this section.

(iii) The system shall determine the total logs of inactivation by multiplying the value calculated in paragraph (2)(d)(i) or (ii) of this section by 3.0.

(e) A system that uses either chloramines or ozone for primary disinfection shall also calculate the logs of inactivation for viruses using a method approved by the Executive Secretary.

(f) The system shall retain disinfection profile data in graphic form, as a spreadsheet, or in some other format acceptable to the Executive Secretary for review as part of sanitary surveys conducted by the Executive Secretary.

(3) Disinfection Benchmarking

(a) Any system required to develop a disinfection profile under the provisions of paragraphs (1) and (2) of this section and that decides to make a significant change to its disinfection practice shall consult with the Executive Secretary prior to making such change. Significant changes to disinfection practice are:

- (i) Changes to the point of disinfection;
- (ii) Changes to the disinfectant(s) used in the treatment plant;
- (iii) Changes to the disinfection process; and
- (iv) Any other modification identified by the Executive Secretary.

(b) Any system that is modifying its disinfection practice shall calculate its disinfection benchmark using the procedure specified in paragraphs (3)(b)(i) through (ii) of this section.

(i) For each year of profiling data collected and calculated under paragraph (2) of this section, the system shall determine the lowest average monthly *Giardia lamblia* inactivation in each year of profiling data. The system shall determine the average *Giardia lamblia* inactivation for each calendar month for each year of profiling data by dividing the sum of daily *Giardia lamblia* of inactivation by the number of values calculated for that month.

(ii) The disinfection benchmark is the lowest monthly average value (for systems with one year of profiling data) or average of lowest monthly average values (for systems with more than one year of profiling data) of

the monthly logs of Giardia lamblia inactivation in each year of profiling data.

(c) A system that uses either chloramines or ozone for primary disinfection shall also calculate the disinfection benchmark for viruses using a method approved by the Executive Secretary.

(d) The system shall submit information in paragraphs (3)(d)(i) through (iii) of this section to the Executive Secretary as part of its consultation process.

(i) A description of the proposed change;

(ii) The disinfection profile for Giardia lamblia (and, if necessary, viruses) under paragraph (2) of this section and benchmark as required by paragraph (3)(b) of this section; and

(iii) An analysis of how the proposed change will affect the current levels of disinfection.

KEY: drinking water, surface water treatment plant monitoring, disinfection monitoring, compliance determinations

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